UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/654,922	09/05/2000	Orly Yadid-Pecht	06816/021002CIT2386	9700

20985 7590 08/11/2005		EXAMINER
FISH & RICHARDSON, PC		NGUYEN, LUONG TRUNG
12390 EL CAMINO REAL		
SAN DIEGO, CA 92130-2081	ART UNIT	PAPER NUMBER
	2612	

DATE MAILED: 08/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>22 February 2005 and 23 November 2004</u>.

2a)☐ This action is **FINAL.**   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>2-13 and 15-24</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>2-13 and 15-24</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

DETAILED ACTION

1.   It is noted that this application No. 09/654,922 has been transferred to Examiner

Luong T. Nguyen, Art Unit 2612.

Continued Examination Under 37 CFR 1.114

2.   A request for continued examination under 37 CFR 1.114, including the fee set forth in

37 CFR 1.17(e), was filed in this application after final rejection. Since this application is

eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e)

has been timely paid, the finality of the previous Office action has been withdrawn pursuant to

37 CFR 1.114. Applicant's submission filed on 02/22/2005 has been entered.

Response to Arguments

3.   Applicant's arguments filed with respect to claims 2-3 filed on 11/23/2004 have been

fully considered but they are not persuasive.

Applicant's arguments with respect to claims 4-13, 15-24 filed on 11/23/2004 have been

considered but are moot in view of the new ground(s) of rejection.

On page 10 of the Amendment, Applicants stated that claim 2 is canceled, however, on

page 3 of the Amendment, the Applicants amended claim 2. Applicants are requested to clarify

the status of claim 2. For the purpose of examination, the Examiner considers claim 2 still

pending.

In re pages 10-11, Applicants argue that Komiya et al. does not teach or suggest that the information is processed to combine portions from the first integration time with portions of information from the longer integration time.

In response, regarding claim 3, the Applicants amended claim3 with limitation "processing information from the readouts to combine portions of information from the first shorter integration time with information from the readouts from the second longer integration time, to form a composite readout." The Examiner considers that claim 3 as amended still does not distinguish from Komiya et al.. Komiya et al. discloses a composite readout as shown in Column 15, Lines 1-5.

4.   The allowance of claims 11-13 and 17-18, as indicated in Paper mailed on 7/23/2004, has been withdrawn due to the newly founded reference Koch et al. (US 4,589,024). The Examiner apologize for the withdrawal of allowance of claims 11-13 and 17-18.

Drawings

5.   Figures 1 and 3 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

It should be noted that the specification discloses Figure 1 in the "Background Section"

and on page 14 (line 1) and page 16 (line 19), further, states Figure is "Prior Art".

It should be noted that Figure 3 shows an active pixel structure disclosed by the U.S.

Patent No. 5,471,515, therefore, Figure 3 should be labeled "Prior Art".

Claim Objections

6.   Claims 6, 10-13, 17-19 are objected to because of the following informalities:

Claim 6 (line 3), "shorter time" should be changed to --shorter integration time--.

Claim 6 (line 4), "longer time" should be changed to --longer integration time--.

Claim 10 (line 5), said "reads an entire row" should be changed to --said reading reads an

entire row--.

Claim 11 (line 2), "comprising: and" should be changed to --comprising:--

Claims 15-16 are objected as being dependent on claim 10.

Claims 12-13, 17-19 are objected as being dependent on claim 11.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

7.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on
sale in this country, more than one year prior to the date of application for patent in the United States.

8.   Claims 2, 3 are rejected under 35 U.S.C. 102(b) as being anticipated by Komiya et al.

(US 5,264,940).

Regarding claims 2 and 3, Komiya et al. discloses a method comprising:

forming a two-dimensional array of pixels (solid-state imaging device or CMD, Column

14, Lines 46-51);

allowing the pixels to receive light representing an image to be detected by allowing the

pixels to accumulate light beginning at a first time (at time "0", reset (RST on the time axis) is

carried out to start accumulation of charges, Figure 21, Column 14, Lines 45-68);

reading out each of the pixels at least at both of a first shorter integration time (period of

time t1, Figure 21), which begins at said first time, and ends at a second time (READ, Figure 21)

and a second longer integration time (period of time t1 + t2), which begins at said first time, and

ends at a third time (READ/RST, Figure 21) which subsequent to said second time (Column 14,

Line 46 through Column 15, Line 17);

processing information from the readouts to combine portions of information from the

first shorter integration time with information from the readouts from the second longer

integration time, to form a composite readout (Column 15, Lines 1-5).

9.   Claims 10, 11, 13, 16, 18 are rejected under 35 U.S.C. 102(b) as being anticipated by

Koch et al. (US 4,589,024).

Regarding claim 10, Koch et al. discloses a method, comprising:

allowing an array of pixels to receive light representing an image to be detected (two

dimensional image sensor, Figure 1, Column 2, Lines 42-60);

reading two separated rows of pixels in each single row readout process wherein said

reading reads an entire row at each reading time (The readout operation is repeated row by row,

within the row duration tzz, Column 4, Lines 43-66).

Regarding claim 11, Koch et al. discloses a method, comprising:

allowing an array of pixels to receive light representing an image to be detected (two

dimensional image sensor, Figure 1, Column 2, Lines 42-60);

reading two separated rows of pixels in each single row readout process (The readout

operation is repeated row by row, within the row duration tzz, Column 4, Lines 43-66), wherein

said two separated rows of pixels represent a first row of pixels representing the image

integration for a shorter integration time, and a second row of pixels representing the image

integration for a longer integration time (Koch et al. discloses that the length of the integration

time tI for an individual row can be varied, this indicates that a first row of pixels representing

the image integration for a shorter integration time, and a second row of pixels representing the

image integration for a longer integration time, Column 5, Line 31 through Column 6, Line 20).

Regarding claim 13, Koch et al. discloses said reading comprises destructively reading

(each row is reset by one of transistors RT1-RTz, Figure 1, Column 2, Line 65 – Column 3, Line

10; since the accumulated signals are destroyed by the reset operation, the reading is

destructively reading).

Regarding claim 16, Koch et al. discloses reading a third row of pixels during each row

readout process (The readout operation is repeated row by row, within the row duration tzz,

Column 4, Lines 43-66).

Regarding claim 18, Koch et al. discloses reading of each of said rows to a separate

storage area (charges accumulated in each rows are transmitted to separate column lines SP1 to

SPm before reading out, Column 4, Lines 15-20).

Claim Rejections - 35 USC § 103

10.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

11.   Claims 4-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Komiya et al.

(US 5,264,940) in view of Koch et al. (US 4,589,024).

Regarding claim 4, Komiya et al. discloses a method comprising:

forming a two-dimensional array of pixels (solid-state imaging device or CMD,

Column 14, Lines 46-51);

allowing the pixels to receive light representing an image to be detected by allowing the

pixels to accumulate light beginning at a first time (at time "0", reset (RST on the time axis) is

carried out to start accumulation of charges, Figure 21, Column 14, Lines 45-68);

reading out each of the pixels at least at both of a first shorter integration time (period of time t1, Figure 21), which begins at said first time, and ends at a second time (READ, Figure 21) and a second longer integration time (period of time t1 + t2), which begins at said first time, and ends at a third time (READ/RST, Figure 21) which subsequent to said second time (Column 14, Line 46 through Column 15, Line 17).

Komiya et al. fails to specifically disclose wherein said reading out comprises reading out first row of pixels representing said first shorter integration time and a second row of pixels representing said second longer integration time. However, Koch et al. teaches a two-dimensional image sensor with regulated integration time in which the readout operation is repeated row by row, within the row duration tzz (Column 4, Lines 43-66), and the length of the integration time tI for an individual row can be varied, this indicates that a first row of pixels representing the image integration for a shorter integration time, and a second row of pixels representing the image integration for a longer integration time (Column 5, Line 31 through Column 6, Line 20). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device in Komiya et al. by the teaching of Koch et al. in order to provide an image sensor in which the integration time is controllable in small steps over a large control range so that very precise regulation of the output signals of the image sensor can be attained (Column 1, Lines 42-45).

Regarding claim 5, Komiya et al. discloses the reading out comprises reading out the pixels into a first buffer representing the shorter integration time, and reading out the pixels into

a second buffer representing the longer integration time (the signals of both integration times are read into frame memory 54, Figure 20).

Regarding claim 6, Komiya et al. discloses the pixels are non-destructively read out (nondestructive read imaging element, Column 14, Lines 56-68), and said reading out comprises reading out the pixels first at said shorter integration time and second at said longer integration time (Column 4, Lines 43-66; Column 5, Line 31 through Column 6, Line 20).

Regarding claim 7, Komiya et al. discloses the reading out comprises reading out the pixels from the shorter integration time into the same buffer (frame memory 54, Figure 20).

Regarding claim 8, Koch et al. discloses the readout operation is repeated row by row, within the row duration tzz (Column 4, Lines 43-66), and the length of the integration time tI for an individual row can be varied (Column 5, Line 31 through Column 6, Line 20), this indicates comprising reading out a third row of the pixels representing information at a third integration time.

Regarding claim 9, Komiya et al. and Koch et al. fail to specifically disclose said pixels are active pixels. However, Official Notice is taken that it is well known in the art to use active pixels in an active pixel type CMOS imager. Therefore, it would have been obvious to use active pixels in the imager of Komiya et al. and Koch et al. in order to place an amplifier in each pixel, this results in lower noise level.

12.   Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koch et al. (US

4,589,024) in view of Komiya et al. (US 5,264,940).

Regarding claim 12, Koch et al. fails to specifically disclose said reading comprises non-

destructively reading. However, Komiya et al. teaching a nondestructive readout by a charge

modulation device CMD (Column 14, Lines 63-67). Therefore, it would have been obvious to

use active pixels in the imager of Koch et al. by the teaching of Komiya et al. in order to prevent

the data from lost when reading out data (Column 15, Lines 1-4).

13.   Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koch et al. (US

4,589,024) in view of Morimura (US 5,455,621).

Regarding claim 15, Koch et al. fails to specifically disclose increasing a dynamic range

of information obtained from a pixel by combining information from a first pixel with a first

integration time and information from said first pixel with a second integration time. However,

Morimura teaches a method for producing an image with a wide dynamic range using an

imaging element in which periods for accumulating charges can be varied (See Abstract, Column

2, Lines 17-31). Therefore, it would have been obvious to one of ordinary skill in the art at the

time the invention was made to modify the device in Koch et al by the teaching of Morimura in

order to produce an image having a wide dynamic range without resulting in white saturation or

black level cut off (Column 1, Lines 9-13).

14.   Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koch et al. (US 4,589,024).

Regarding claim 17, Koch et al. fails to specifically disclose carrying out correlated double sampling as part of said reading. However, Official Notice is taken that it is well known in the art to include a correlated double sampling circuit in reading out signal from an image sensor to reduce noise of the electric signal. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a correlated double sampling circuit into the device of Koch et al. in order to reduce noise of the electric signal readout from an image sensor.

15.   Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koch et al. (US 4,589,024).

Regarding claim 19, Koch et al. fail to specifically disclose said pixels are active pixels. However, Official Notice is taken that it is well known in the art to use active pixels in an active pixel type CMOS imager. Therefore, it would have been obvious to use active pixels in the imager of Komiya et al. and Koch et al. in order to place an amplifier in each pixel, this results in lower noise level.

16.   Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Morimura (US 5,455,621) in view of Komiya et al. (US 5,264,940).

Regarding claim 20, Morimura discloses a system, comprising:

a semiconductor substrate defining a two-dimensional array of pixels (light receiving

portion 20, Figure 3, Column 5, Lines 62-67), each of said pixels formed with a photoreceptor

portion (photodiode 21, Figure 3) therein, and at least one active readout portion (vertical CCDs

22, Figure 3) therein,

a readout control part, controlling said pixels to allow the pixels to receive light

representing an image to be detected, and allowing the pixels to accumulate light for an

integration, and to control the pixels to readout information from the pixels representative of

light reception for a first integration time (period CS1, Figure 2A, Column 5, Line 36 through

Column 6, Line 63), and a second integration time (period CL1, Figure 2A, Column 5, Line 36

through Column 6, Line 63), longer than said first integration time, such that each pixel provides

light output integrated over both of said first and second integration times (Figure 2A).

Morimura fails to specifically disclose a first integration time staring at a first time and a

second integration time also starting at said first time. However, Komiya et al. teaches an image

sensing apparatus having exposure level and dynamic range control circuit, in which a period of

time t1 (first integration time) starts at time "0" (RST on the time axis, Figure 21) and a second

period of time (t1+t2) also starts at time "0" (RST on the time axis, Figure 21). Therefore, it

would have been obvious to one of ordinary skill in the art at the time the invention was made to

modify the device of Morimura by the teaching of Komiya et al. in order to prevent the data from

lost when reading out data (Column 15, Lines 1-4).

Regarding claim 21, Morimura discloses in Figure 8A, the readout control part also

controls the pixels to accumulate light for a third integration time.

Regarding claim 22, Morimura discloses, in Figure 1, an image information combiner (adder 6), which combines information from the first shorter integration time with information from the second integration time, to produce composite information about the image (Morimura teaches adder 6 for synthesizing the image data accumulated at different time periods).

Regarding claim 23, Morimura discloses, in Figure 20A, a first buffer (S30), on the semiconductor substrate, receiving information indicative of the light integrated for the first integration time (S20), and a second buffer (S70), receiving information indicative of the light integrated for the second integration time (S60).

Regarding claim 24, Morimura discloses, in Figure 3, a buffer (storage portion 23) receiving information indicative of the light integrated for the first integration time and indicative of the light integrated for the second integration time.

Conclusion

17.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to LUONG T. NGUYEN whose telephone number is (571) 272-7315. The examiner can normally be reached on 7:30AM - 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, WENDY GARBER can be reached on (571) 272-7308. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

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system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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08/03/05

**LUONG T. NGUYEN
PATENT EXAMINER**